

Survey of the Fishes of the Bois de Sioux River in South Dakota

Final report

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Compiled by Matthew Wagner, Chad Kaiser, Logan Gutzmer, and Morgan Kauth

Project overview:

The Bois de Sioux River (Red River of the North drainage) is one of the least sampled rivers throughout all of South Dakota. There are only 18 historically sampled sites throughout the entire drainage in the state and only two of them were sampled with standardized methods (South Dakota Fish Distribution Database 2015, Natural Heritage Fish Reference Collection for South Dakota 2015, MN DNR 1999). Additionally, the majority of the 18 historical samples contain only a single species (angler records) or were completed between 1892-1999. A single site was sampled in 2006 (South Dakota Fish Distribution Database 2015, Natural Heritage Fish Reference Collection for South Dakota 2015), but only sampled four of the 24 species sampled at the same site by the Minnesota Department of Natural Resources in 1999 (South Dakota Fish Distribution Database 2015, Natural Heritage Fish Reference Collection for South Dakota 2015, MN DNR 1999). The lack of quality survey data for this unique drainage in South Dakota merited a comprehensive survey utilizing standard methods. This project was designed to sample fishes utilizing standard methods at four mainstem and four tributary sites in the Red River of the North drainage in northeast South Dakota (Figure 1) over a three day period in the spring of 2015, to provide an update to the distribution of fishes in the drainage. Two sites were resampled during a one day survey, to further elaborate on the distribution of fishes within the drainage.

Apart from being highly under-sampled throughout history, the Bois de Sioux River presents an opportunity to document species not previously found in South Dakota. Greater Redhorse (*Moxostoma valenciennes*), Silver Redhorse (*Moxostoma anisurum*), and River Darter (*Percina shumardi*) are previously unrecorded in the state, but are native to the Red River of the North drainage and found downstream in the reach that creates the North Dakota/Minnesota border. Additionally, Chestnut Lamprey (*Ichthyomyzon castaneus*), Silver Lamprey (*Ichthyomyzon unicuspis*), American Eel (*Anguilla rostrata*), Mooneye (*Hiodon tergisus*), and Lake Sturgeon (*Acipenser fulvescens*) have been historically documented in the state in the Missouri River drainage, but not in the Bois de Sioux River in South Dakota, where they are also found downstream in the reach that creates the North Dakota/Minnesota border. Presence of an *Ichthyomyzon* species was confirmed in the area as a single specimen of an *Ichthyomyzon* was photographed by an angler at the mouth of the Bois de Sioux River in 2012, but was unable to be identified due to poor resolution (Figure 2).

Objectives:

1. Survey the fishes at eight sites in the Bois de Sioux River drainage in South Dakota utilizing standard methods.
2. Survey the fishes at four mainstem sites in the Bois de Sioux River drainage in South Dakota utilizing passive sampling gear to target species of greatest conservation need (SGCN).

Methods:

Objective 1 for this study was to “survey the fishes at eight sites in the Bois de Sioux River drainage in South Dakota utilizing standard methods”. Eight sites within the Red River of the North drainage in northeastern South Dakota were surveyed between April 24, 2015 and April 26, 2015. Reaches at sites were established utilizing standard operating procedures for field samplers provided by the South Dakota Department of Environment and Natural Resources, Volume II (SD DENR, 2005). All sites were collected using upstream electrofishing. No block nets were used at any sites. All eight sites were actively sampled with either barge (MDW2015-02, MDW2015-06, MDW2015-07, and MDW2015-08) or backpack (MDW2015-01, MDW2015-03, MDW2015-04, and MDW2015-05) electrofishing units and three netters. All fish were enumerated (Table 1 and Table 2) and total length was recorded for the first 50 fish of each species. Raw data with fish lengths were submitted with the final report in an accompanying excel file. When possible, two of each species were vouchered in 10% formalin to be deposited in the Natural Heritage Fish Reference Collection for South Dakota at South Dakota State University.

Additionally, sites MDW2015-01 and MDW2015-02 (Table 3 and Table 4) were actively sampled with a barge electrofishing unit and three netters on May 18th, 2015 when higher flows existed due to rainfall. Reaches at sites were established utilizing standard operating procedures for field samplers provided by the South Dakota Department of Environment and Natural Resources, Volume II (SD DENR, 2005). All sites were collected using upstream electrofishing. No block nets were used at any sites. All fish were enumerated (Table 3 and Table 4) and total length was recorded for the first 50 fish of each species. Raw data with fish lengths will be submitted with the final report in an accompanying excel file. No fish were vouchered from the secondary surveys.

Objective 2 for this study was to “survey the fishes at four mainstem sites in the Bois de Sioux River drainage in South Dakota utilizing passive sampling gear to target species of greatest conservation need (SGCN)”. To meet this objective, the four mainstem sites on the Bois de Sioux River (MDW2015-02, MDW2015-03, MDW2015-07, and MDW2015-08) were additionally sampled with two small mesh fyke nets with a 12 hour set. Sites MDW2015-02 and MDW2015-08 each received one 3’ x 5’ and one 2’ x 4’ mini-fyke net, while sites MDW2015-

03 and MDW2015-07 each received two 3' x 5' mini-fyke nets. All fish were enumerated (Table 5 and Table 6) and total length was recorded for the first 50 of each species. When possible, two of each species were vouchered in 10% formalin to be deposited in the Natural Heritage Fish Reference Collection for South Dakota at South Dakota State University.

Results:

A total of 2161 fish were sampled among the 10 sites sampled. Active sampling resulted in 2037 fish comprised of 23 species (Tables 1, 2, 3, and 4). Passive sampling resulted in 124 fish comprised of 11 species (Tables 5 and 6).

Although fish sampling methods targeted species of conservation concern, none of the eight potential species previously unsampled in the drainage in South Dakota (Greater Redhorse, Silver Redhorse, River, Chestnut Lamprey, Silver Lamprey, American Eel, Mooneye, and Lake Sturgeon) were collected during this survey. However, communication with Dean Shultz, the Sisseton conservation officer, led to the location of an *Ichthyomyzon* voucher collected at White Rock Dam (same locality as MDW2015-02) by Frank Conda (a retired Sisseton High School biology teacher) which was received and donated to the fish collection at South Dakota State University on May 9, 2015 and identified as a Silver Lamprey. Seven species (Bismouth Buffalo *Ictiobus cyprinellus*, Black Crappie *Pomoxis nigromaculatus*, Green Sunfish *Lepomis cyanellus*, Rock Bass *Ambloplites rupestris*, Quillback *Carpiodes cyprinus*, White Bass *Morone chrysops*, and White Crappie *Pomoxis annularis*) that were sampled in August of 1999 by the Minnesota Department of Natural Resources (MNDNR 1999) were not collected during this survey. Stonecat *Noturus flavus* were also not collected during this survey although historical records do exist within the sampled reaches.

Discussion:

During the sampling period (April 24, 2015 – April 25, 2015) water release from White Rock Dam was non-existent and caused the Bois de Sioux River to be below baseline flow conditions. The below baseline conditions may account for the low species diversity compared to historical samples (potentially attributed to the lack of available habitat). Although no new species were documented in the drainage in the state by the survey, the survey provided updated distribution records for 25 species in the Red River of the North drainage in South Dakota. Records of Blackside Darter *Percina maculata* are of particular note as it is considered a species of greatest conservation need in the South Dakota Wildlife Action Plan (South Dakota Department of Game, Fish and Parks) and is tracked by the Natural Heritage Program in South Dakota.

Literature Cited:

South Dakota Fish Distribution Database. 2015. Brookings, SD. South Dakota State University, 2015.

Natural Heritage Fish Reference Collection for South Dakota. 2015. Dave Willis Museum. Brookings, SD. South Dakota State University, 2015.

MNDNR (Minnesota Department of Natural Resources), 1999. Section of Fisheries Stream Survey of Bois de Sioux River 1999.

SD DENR (South Dakota Department of Environment and Natural Resources), 2005. Standard operating procedures for field samplers, Volume II. SD DENR, Pierre, SD.

South Dakota Department of Game, Fish and Parks. 2014. South Dakota Wildlife Action Plan. Wildlife Division Report 2014-03. South Dakota Department of Game, Fish and Parks, Pierre.

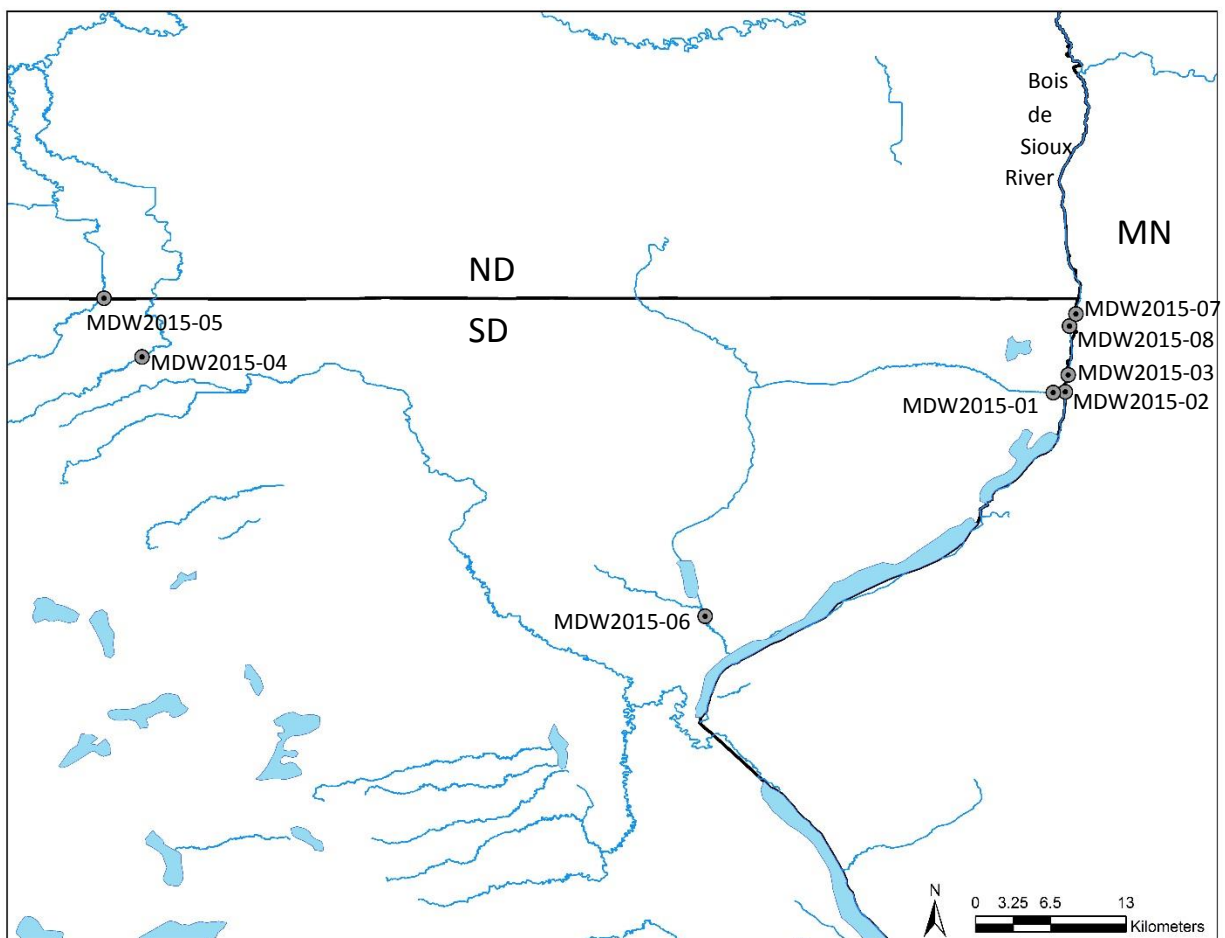


Figure 1. Map of sampling sites.



Figure 2. Unidentified *Ichthyomyzon* caught by anglers in 2012 at the mouth of the Bois de Sioux River.

Table 1. Relative abundance of fishes sampled at all eight sites using active sampling within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-01	MDW2015-02	MDW2015-03	MDW2015-04	MDW2015-05	MDW2015-06	MDW2015-07	MDW2015-08
Collection Date	4/24/2015	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/26/2015	4/26/2015
Method of Collection	Backpack Shocker	Barge Shocker	Backpack Shocker	Backpack Shocker	Backpack Shocker	Barge Shocker	Barge Shocker	Barge Shocker
Number of Netters	3	3	3	3	3	3	3	3
Reach Length (meters)	144	231.7	300	100	100	210	300	300
Downstream Latitude	45.86204	45.86487	45.88717	45.91864	45.9333	45.68848	45.92403	45.91946
Downstream Longitude	-96.57528	-96.57238	-96.5691	-97.27723	-97.32585	-96.85225	-96.56462	-96.56433
Locality	Unnamed Tributary to Bois de Sioux River near White Rock Dam	Bois de Sioux River near White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Shortfoot Creek	La Belle Creek	Jim Creek	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River south of Haggart Avenue
Black Bullhead	1	2	2	0	1	2	2	2
Blackside Darter	9	22	5	0	0	0	3	0
Bluegill	0	0	0	0	0	1	0	0
Bluntnose Minnow	0	1	0	0	0	0	0	0
Brook Stickleback	2	1	2	0	0	0	2	1
Common Carp	0	1	0	0	0	58	3	0
Creek Chub	12	7	1	0	0	0	0	0
Emerald Shiner	0	111	14	0	0	0	87	0
Fathead Minnow	21	93	3	4	0	791	12	0
Iowa Darter	0	0	0	0	0	1	0	1
Johnny Darter	2	0	8	0	0	0	4	0
Northern Pike	0	0	0	0	0	0	17	25
River Carpsucker	0	0	0	0	0	0	0	0
Sand Shiner	4	55	0	0	0	0	121	0
Shorthead Redhorse	4	1	0	0	0	0	1	0
Spotfin Shiner	6	11	2	0	0	0	58	0
Tadpole Madtom	0	0	0	0	0	0	0	0
Walleye	1	0	0	0	0	0	30	15
White Sucker	20	1	0	4	1	0	1	1
Yellow Bullhead	0	1	0	0	0	0	0	0
Yellow Perch	0	0	0	0	0	3	1	0
Total Count	82	307	37	8	2	856	342	45

Table 2. Catch Per Unit Effort (fish per meter) of fishes sampled using active sampling at all eight sites within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-01	MDW2015-02	MDW2015-03	MDW2015-04	MDW2015-05	MDW2015-06	MDW2015-07	MDW2015-08
Collection Date	4/24/2015	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/26/2015	4/26/2015
Method of Collection	Backpack Shocker	Barge Shocker	Backpack Shocker	Backpack Shocker	Backpack Shocker	Barge Shocker	Barge Shocker	Barge Shocker
Number of Netters	3	3	3	3	3	3	3	3
Reach Length (meters)	144	231.7	300	100	100	210	300	300
Downstream Latitude	45.86204	45.86487	45.88717	45.91864	45.9333	45.68848	45.92403	45.91946
Downstream Longitude	-96.57528	-96.57238	-96.5691	-97.27723	-97.32585	-96.85225	-96.56462	-96.56433
Locality	Unnamed Tributary to Bois de Sioux River near White Rock Dam	Bois de Sioux River near White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Shortfoot Creek	La Belle Creek	Jim Creek	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River south of Haggart Avenue
Black Bullhead	0.007	0.009	0.007	0.000	0.010	0.010	0.007	0.007
Blackside Darter	0.063	0.095	0.017	0.000	0.000	0.000	0.010	0.000
Bluegill	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000
Bluntnose Minnow	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Brook Stickleback	0.014	0.004	0.007	0.000	0.000	0.000	0.007	0.003
Common Carp	0.000	0.004	0.000	0.000	0.000	0.276	0.010	0.000
Creek Chub	0.083	0.030	0.003	0.000	0.000	0.000	0.000	0.000
Emerald Shiner	0.000	0.479	0.047	0.000	0.000	0.000	0.290	0.000
Fathead Minnow	0.146	0.401	0.010	0.040	0.000	3.767	0.040	0.000
Iowa Darter	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.003
Johnny Darter	0.014	0.000	0.027	0.000	0.000	0.000	0.013	0.000
Northern Pike	0.000	0.000	0.000	0.000	0.000	0.000	0.057	0.083
River Carpsucker	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sand Shiner	0.028	0.237	0.000	0.000	0.000	0.000	0.403	0.000
Shorthead Redhorse	0.028	0.004	0.000	0.000	0.000	0.000	0.003	0.000
Spotfin Shiner	0.042	0.047	0.007	0.000	0.000	0.000	0.193	0.000
Tadpole Madtom	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Walleye	0.007	0.000	0.000	0.000	0.000	0.000	0.100	0.050
White Sucker	0.139	0.004	0.000	0.040	0.010	0.000	0.003	0.003
Yellow Bullhead	0.000	0.004	0.000	0.000	0.000	0.000	0.000	0.000
Yellow Perch	0.000	0.000	0.000	0.000	0.000	0.014	0.003	0.000
Total CPUE	0.569	1.325	0.123	0.080	0.020	4.076	1.140	0.150

Table 3. Relative abundance of fishes sampled during secondary survey at two sites using active sampling within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-01	MDW2015-02
Collection Date	4/24/2015	4/25/2015
Method of Collection	Backpack Shocker	Barge Shocker
Number of Netters	3	3
Reach Length (meters)	144	231.7
Downstream Latitude	45.86204	45.86487
Downstream Longitude	-96.57528	-96.57238
Locality	Unnamed Tributary to Bois de Sioux River near White Rock Dam	Bois de Sioux River near White Rock Dam
Black Bullhead	1	2
Bluegill	2	0
Brook Stickleback	1	0
Channel Catfish	0	1
Common Carp	18	0
Common Shiner	1	0
Creek Chub	1	0
Emerald Shiner	54	0
Fathead Minnow	166	0
Freshwater Drum	0	1
Northern Pike	1	3
Orangespotted Sunfish	1	0
River Carpsucker	3	8
Sand Shiner	74	0
Shorthead Redhorse	0	1
Spotfin Shiner	11	3
Walleye	2	3
Total Count	336	22

Table 4. Catch Per Unit Effort (fish per meter) of fishes sampled during secondary survey at two sites within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-09	MDW2015-10
Collection Date	5/18/2015	5/18/2015
Method of Collection	Barge Shocker	Barge Shocker
Number of Netters	3	3
Reach Length (meters)	300	150
Downstream Latitude	45.86575	45.862071
Downstream Longitude	-96.5722	-96.574993
Locality	Bois de Sioux River near White Rock Dam	Unnamed Tributary to Bois de Sioux River near White Rock Dam
Black Bullhead	0.003	0.013
Bluegill	0.007	0.000
Brook Stickleback	0.003	0.000
Channel Catfish	0.000	0.007
Common Carp	0.060	0.000
Common Shiner	0.003	0.000
Creek Chub	0.003	0.000
Emerald Shiner	0.180	0.000
Fathead Minnow	0.553	0.000
Freshwater Drum	0.000	0.007
Northern Pike	0.003	0.020
Orangespotted Sunfish	0.003	0.000
River Carpsucker	0.010	0.053
Sand Shiner	0.247	0.000
Shorthead Redhorse	0.000	0.007
Spotfin Shiner	0.037	0.020
Walleye	0.007	0.020
Total CPUE	1.120	0.147

Table 5. Relative abundance of fishes sampled using passive sampling at all four sites within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-02	MDW2015-02	MDW2015-03	MDW2015-03	MDW2015-07	MDW2015-07	MDW2015-08	MDW2015-08
Collection Date	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/26/2015	4/26/2015	4/26/2015	4/26/2015
Method of Collection	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net
Net Dimensions	3' x 5'	3' x 5'	2' x 4'	3' x 5'	3' x 5'	2' x 4'	3' x 5'	3' x 5'
Hours set	12	12	12	12	12	12	12	12
Latitude	45.862436	45.862992	45.885273	45.885078	45.92217	45.921666	45.919825	45.919428
Longitude	-96.573313	-96.572959	-96.569369	-96.5694	-96.564474	-96.564367	-96.564216	-96.564389
Locality	Bois de Sioux River near White Rock Dam	Bois de Sioux River near White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River south of Haggart Avenue	Bois de Sioux River south of Haggart Avenue
Black Bullhead	2	21	0	4	1	0	0	1
Blackside Darter	0	0	0	0	0	0	0	0
Bluegill	0	0	0	0	0	0	0	0
Bluntnose Minnow	0	0	0	0	0	0	0	0
Brook Stickleback	0	0	2	3	0	0	0	0
Common Carp	0	4	0	0	0	0	0	0
Creek Chub	0	0	0	0	0	0	0	0
Emerald Shiner	0	0	0	0	0	2	0	0
Fathead Minnow	0	1	2	2	0	0	0	1
Iowa Darter	0	0	0	0	0	0	0	0
Johnny Darter	0	0	0	0	0	0	0	0
Northern Pike	0	3	0	0	8	0	10	13
River Carpsucker	0	0	0	0	0	0	1	0
Sand Shiner	0	0	1	1	0	0	0	0
Shorthead Redhorse	0	0	0	0	0	0	0	0
Spotfin Shiner	0	0	0	0	0	0	0	0
Tadpole Madtom	0	1	0	0	0	0	0	0
Walleye	0	4	0	0	6	0	21	6
White Sucker	2	0	0	0	0	0	0	1
Yellow Bullhead	0	0	0	0	0	0	0	0
Yellow Perch	0	0	0	0	0	0	0	0
Total Count	4	34	5	10	15	2	32	22

Table 6. Catch Per Unit Effort (fish per hour) of fishes sampled using passive sampling at four sites within the Red River of the North drainage in South Dakota.

Field Number	MDW2015-02	MDW2015-02	MDW2015-03	MDW2015-03	MDW2015-07	MDW2015-07	MDW2015-08	MDW2015-08
Collection Date	4/25/2015	4/25/2015	4/25/2015	4/25/2015	4/26/2015	4/26/2015	4/26/2015	4/26/2015
Method of Collection	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net	Fyke net
Net Dimensions	3' x 5'	3' x 5'	2' x 4'	3' x 5'	3' x 5'	2' x 4'	3' x 5'	3' x 5'
Hours set	12	12	12	12	12	12	12	12
Latitude	45.862436	45.862992	45.885273	45.885078	45.92217	45.921666	45.919825	45.919428
Longitude	-96.573313	-96.572959	-96.569369	-96.5694	-96.564474	-96.564367	-96.564216	-96.564389
Locality	Bois de Sioux River near White Rock Dam	Bois de Sioux River near White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Bois de Sioux River 1.6 miles downstream of White Rock Dam	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River north of Haggart Avenue	Bois de Sioux River south of Haggart Avenue	Bois de Sioux River south of Haggart Avenue
Black Bullhead	0.167	1.750	0.000	0.333	0.083	0.000	0.000	0.083
Blackside Darter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bluegill	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Bluntnose Minnow	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Brook Stickleback	0.000	0.000	0.167	0.250	0.000	0.000	0.000	0.000
Common Carp	0.000	0.333	0.000	0.000	0.000	0.000	0.000	0.000
Creek Chub	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Emerald Shiner	0.000	0.000	0.000	0.000	0.000	0.167	0.000	0.000
Fathead Minnow	0.000	0.083	0.167	0.167	0.000	0.000	0.000	0.083
Iowa Darter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Johnny Darter	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Northern Pike	0.000	0.250	0.000	0.000	0.667	0.000	0.833	1.083
River Carpsucker	0.000	0.000	0.000	0.000	0.000	0.000	0.083	0.000
Sand Shiner	0.000	0.000	0.083	0.083	0.000	0.000	0.000	0.000
Shorthead Redhorse	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spotfin Shiner	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Tadpole Madtom	0.000	0.083	0.000	0.000	0.000	0.000	0.000	0.000
Walleye	0.000	0.333	0.000	0.000	0.500	0.000	1.750	0.500
White Sucker	0.167	0.000	0.000	0.000	0.000	0.000	0.000	0.083
Yellow Bullhead	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Yellow Perch	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total CPUE	0.333	2.833	0.417	0.833	1.250	0.167	2.667	1.833